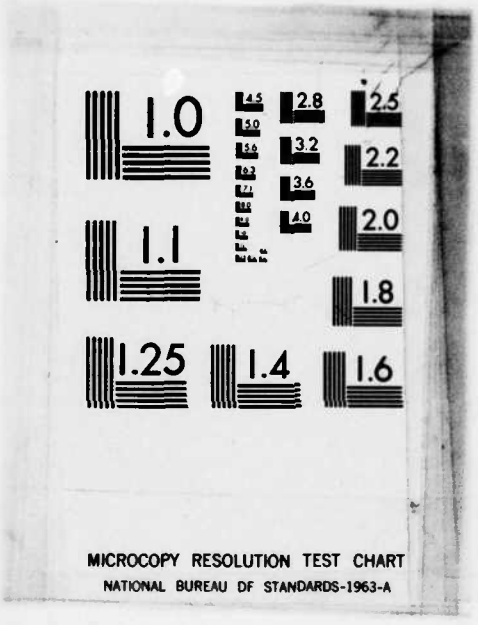
AD-A132 145 AN ORGANIZATION DESIGN FOR THE PERSPAY CONSOLIDATED DATA CENTER(U) NAVAL POSTGRADUATE SCHOOL MONTEREY CA N H CRANE JUN 83 1/1

UNCLASSIFIED F/G 5/1 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

(2)

NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

AN ORGANIZATION DESIGN
FOR THE
PERSPAY CONSOLIDATED DATA CENTER

by

Norman H. Crane

June, 1983

Thesis Advisor: Roger H. Weissinger-Baylon

Approved for Public Release, Distribution Unlimited

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A132145	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) An Organization Design for the PERSPAY Consolidated Data Center		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis June, 1983
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Norman H. Crane		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93940		12. REPORT DATE June, 1983
		13. NUMBER OF PAGES 92
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for Public Release, Distribution Unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

PERSPAY Data Center, Organization Design, Organization Structure,

Data Center Structure, Data Center Design

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The PERSPAY Consolidated Data Center (CDC) is to be a large data processing activity used by both the Navy Finance Center, Cleveland, and the Naval Military Personnel Command, Washington, D.C. The CDC is to be located in Cleveland and operated by NFC.

This thesis develops an organization design and the beginnings of a transition plan for the CDC. The organization design concepts of Jay R. Galbraith are used to analyze NFC's current data processing

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

S/N 0102-LF-014-6601

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Abstract Continued, Block # 20

Department. These concepts are then used to develop an organizational structure and a system for communication and coordination within the CDC and between the CDC and its users.

Approved for public release, distribution unlimited

An Organization Design for the PERSPAY Consolidated Data Center

by

Norman H. Crane
Lieutenant Commander, United States Navy
B.A., Marietta College, 1972

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN INFORMATION SYSTEMS

from the

NAVAL POSTGRADUATE SCHOOL
June, 1983

Author: Norman H. Crane

Approved by: Roger Weissinger-Baylon
Thesis Advisor

Solange Peret
Second Reader

Richard S. Elster
Chairman, Department of Administrative Science

Kneale T. Marshall
Dean of Information and Policy Sciences

ABSTRACT

The PERSPAY Consolidated Data Center (CDC) is to be a large data processing activity used by both the Navy Finance Center, Cleveland, and the Naval Military Personnel Command, Washington, D.C. The CDC is to be located in Cleveland and operated by NFC.

This thesis develops an organization design and the beginnings of a transition plan for the CDC. The organization design concepts of Jay R. Galbraith are used to analyze NFC's current data processing Department. These concepts are then used to develop an organizational structure and a system for communication and coordination within the CDC and between the CDC and its users.

TABLE OF CONTENTS

I. INTRODUCTION

The PERSPAY Consolidated Data Center will be a joint use computer facility shared by the Navy Finance Center (NFC) and the Navy Military Personnel Command (NMPC). The goals of the PERSPAY project are to reduce costs in procuring replacement computer equipment for both commands and to facilitate the interface between the pay and personnel functions. The Consolidated Data Center will be created from NFC's current Data Processing Department. The Data Center will use the same building and physical plant, the same people plus some new ones, and some, but not all, of the same systems and procedures. The computer equipment will be new and the Data Center will have a new customer, NMPC, who will approximately double the workload. The Consolidated Data Center will be run by the Navy Finance Center.

The technical problems involved with this project are being identified and worked out; the selection and installation of hardware and software, the testing and operation of hardware, systems software, and applications programs, the operation of specific machines and systems, and so on. Given that the technical problems will be solved, the issue to be addressed here is how to operate the Data Center as a whole and how to transform NFC's present Data Processing Department into the joint use Consolidated Data Center.

The basic assumption of this thesis is that a transition plan requires a clear understanding of the beginning and ending points of the transition. Stated in different terms, in order to determine how to get from "here" to "there," it is first necessary to clearly define both "here" and "there." Having done that, the end points of the transition can be compared and the differences identified. These differences become the issues to be addressed by the transition plan.

A second assumption is that the problems of defining and describing the end points of the transition are problems in organization design. Organization design is more that a standard organization chart. It is the overall way that jobs, people and things are brought together in an organization in order to accomplish its mission (Galbraith, 1977). In this case, the people, equipment, facilities, and tasks are already in place or will be soon. How can all of these things be coordinated so that the data center can effectively and efficiently do its work? The concepts of organization design can be used to answer this question.

These two assumptions are the basis for the methodology to be used in this thesis. The concepts of organization design will be presented and then used to analyze the present N.F.C. Data Processing Department. This analysis will determine if the present design is a "good fit." It will define the beginning point of the transition project.

Second, the differences between the tasks of the present D.P. Department and the Consolidated Data Center will be identified. A modification to the present organization design to accomodate these changed tasks will be proposed. This proposal will include a modified organization structure and a system for communication and coordination. While any number of completely new designs could be used, there are advantages to minimizing the disruption and confusion of installing new equipment and radically changing organization at the same time. Therefore a modified version of the present design will be used as a starting point. The analysis of the new design will point out the changes necessary to transform the present operation into the new Data Center. These changes will be the basis of the transition plan.

The conclusion of this process will be a series of recommendations to NFC concerning:

1) proposed changes to the present organization design (other than an increase in size) to facilitate the overall operation of the Consolidated Data Center,

2) a description of the process that can be used to develop a transition plan for converting the present organization into the Consolidated Data Center.

II. BACKGROUND AND METHODOLOGY

A. THE PERSPAY PROJECT

For many years, both NFC and NMPC have used computers to help carry out their missions. The Naval Military Personnel Command, formerly the Bureau of Naval Personnel, is located in Washington, D.C. It is concerned with managing the Navy's in-uniform personnel. By the late 1970's, NMPC's in-house computer facility was saturated and outside time sharing services were being used to augment it. The Navy Finance Center deals with managing the pay and allowances for all Navy personnel. NFC is located in Cleveland, Ohio. The main offices are in the Federal Office Building in downtown Cleveland while the computer facility is located at the Issac Campbell Kidd Computer Center (ICKCC) in Bratenahl, Ohio, about five miles away. The physical plant at Bratenahl is new but the computers there are reaching the end of their service life.

The in-house computer equipment at both NFC and NMPC had been purchased by the Navy with the permission of the General Services Administration (GSA) in the form of Delegations of Procurement Authority (DPA). (All government computers must be acquired either by the GSA or with their approval.) Both DPA's happen to expire in 1979. In July, 1978, the GSA extended the DPA's for both systems to

February, 1982 and directed that both systems be replaced by competitive procurement. Because of the similarity of the requirements for equipment replacement and because of the basic commonality of the pay and personnel functions, NFC, NMPC, and their superiors decided to procure replacement computers through a single joint effort. (PERSPAY)

Two studies were completed in 1979; the Brand X study in February and the PERSPAY study in December. The Brand X study assumed a joint procurement of "Brand X" computers and examined alternative locations for this equipment. The alternatives considered were locating the computers in Washington and Cleveland, New Orleans and Cleveland, co-location in Cleveland, and co-location in New Orleans. On the basis of a comprehensive cost/benefit analysis, the Brand X study recommended co-location at the Bratenahl facility in Cleveland (Brand X). The PERSPAY study went on to examine the issues of augmentation of existing equipment versus replacement, the expanded use of commercial time sharing, and the problem of compatibility of new equipment with the current computers. The study recommended consolidation of computer resources in Cleveland with a competitive procurement of compatible equipment to replace both existing computer systems (PERSPAY).

Subsequent work by NFC and NMPC has refined the purpose and methods of the procurement/consolidation effort. The major players agreed to use the Multiple Virtual Storage

operating system (MVS) in the new data center. NFC has been using MVS for several years. However, NMPC has been using an older operating system called MVT. Because of the change in operating systems and because of some local modifications that NMPC had made to their version of MVT, considerable effort will be required for NMPC to convert their applications programs to MVS for execution in the new data center. This has led to a project plan with several phases. NMPC is procuring two machines for the purpose of converting applications to MVS in preparation for migration to the Consolidated Data Center. One machine, an IBM 4341, is located in Cleveland and was placed in operation in March, 1983. A second machine, an IBM 3033, will be installed in NMPC's newly renovated computer facility in Washington. NFC is procuring three IBM 3081's, or compatible equipment, for the Consolidated Data Center. Once all work has migrated to the new equipment, the old equipment will be released and work on a second, fully competitive procurement for follow-on equipment will commence. (NMPC PERSPAY Project Management Plan)

A number of broad guidelines and several more specific agreements have been worked out between NFC and NMPC concerning the operation of the data center. Briefly, both parties agree that NFC will procure, install, and operate the new ADP equipment. Following the migration of NFC's

workload to the new IBM 3081's, NFC will start to support NMPC's ADP workload. The data center will be mission funded by NFC; i.e., no chargeback scheme is presently planned. Since both users are physically separated from the computer facility, all jobs, input, and output will be submitted and returned by either delivery of magnetic tape or by telecommunications. Other than the processing of magnetic tape, all pre- and post-computer processing will be done by the customer. The data center will handle scheduled batch jobs, on-line program development and data entry, remote job entry, and on-demand job processing. NFC, in consultation with NMPC will promulgate standard operating procedures and a User's Guide as well as allocating and managing computer resources. NFC and NMPC will jointly set required service levels in terms of response time and turnaround time. (NMPC/NFC ADP Support Agreement)

NFC and NMPC have started to work on the creation of the new data center by forming a number of joint working groups. Each group is working in a specific area: 1) hardware/software, 2) telecommunications, 3) operations transition, 4) security, 5) production control, 6) standards and procedures. Each group has a charter that specifies the scope of its work. For example, the Operations Transition group areas of responsibility include: 1) computer operations, 2) support operations, 3) data media library,

4) workload migration, 5) compatibility. 6) configuration management and performance measurement, 7) remote sites.

In sum, the overall strategy for implementation of the Consolidated Data Center includes three broad concurrent projects. NMPC is converting its workload to MVS. At the same time, NFC is replacing its present equipment with newer, more powerful equipment and transferring its ADP workload to the new equipment. The joint working groups are developing and deciding on the techniques, peripheral equipment, software, procedures, and standards necessary to implement and run the new data center. The next step will be the migration of NMPC's workload to NFC and the actual operation of the Consolidated Data Center.

The specific problem at hand for this thesis is, given that the new hardware and software will be properly installed and made ready for use, how shall NFC and its D.P. Department go about transitioning from its present operation to the joint use Consolidated Data Center operation? Should the new organization be an expanded version of the present structure or should it be changed? What changes, if any should be made? When and how should changes be made?

The method to be used for attacking this problem is to view it as a problem in organization design. What organizational structure will allow the CDC to impartially serve two users? What communication and coordination system can adequately support the CDC when the computer center is in

Bratenahl and the users are in Cleveland and Washington? Is there a suitable organization design for the CDC that is feasible to develop from the present NFC D.P. Department; one that considers the people and politics involved, that can be built incrementally, and that is not too costly? These are all issues in the field of organization design.

B. ORGANIZATION DESIGN

1. Application to the CDC

There is a large amount of literature on organizations; what constitutes an organization, how one operates, and how organizations can be structured. Necessity dictates that only a small portion of that body of knowledge be included in this thesis. Some of the theories and analytical techniques of Jay R. Galbraith (Galbraith, 1977) will be used to examine the present and proposed organization designs of NFC's data processing operation.

Galbraith's work is well recognized and is suitable for the present problem. His two major works on organizations, Designing Complex Organizations (1973) and Organization Design (1977), have been referenced in other studies on information systems management (Olson). This work is especially suited to this problem as Galbraith has specifically addressed the problems of integrating computers and other information systems technology into an organization design.

Dr. Galbraith is currently directing his own management consulting firm in Denver and is associated with several others. He specializes in the fields of organization design change and development. Dr. Galbraith has been on the faculties of the Sloan School of Management at M.I.T. and the Wharton School of the University of Pennsylvania and has been affiliated with the European Institute of Advanced Studies in Brussels. His most recent publications deal with the management of international corporations and with the design of innovating organizations (Galbraith, 1982). Galbraith's concepts are especially suitable to the CDC design problem because of his academic and business experience in organization design and in information technology.

The essential characteristics of an organization, according to Galbraith and others, are that it is: 1) composed of people, 2) for the purpose of achieving some common goal(s), 3) by pooling and combining the specialized labor of individuals, 4) coordinated through an information based decision process. Organizations commonly grow naturally whenever there is a problem or task that requires the efforts of more than a few people and there are enough people who perceive this task in the same way. That is, there must be mutually held beliefs by the organization's members that shape their behaviors. Individual's actions when in an organization should conform to the organization's

mutually held values. But the problem is that as an organization grows, its original goals and the behaviors required of individuals to achieve them become unclear. Without guidance and incentives, individuals tend to revert to previously learned behaviors that are often inappropriate in a performance oriented organization. The goal of organization design is to develop a system that provides guidance and incentive to individuals in the organization and to provide the mechanisms necessary for these individuals to do their specific jobs. These specific jobs include both basic production and service activities and the management and coordination of these basic tasks. (Galbraith, 1977)

What things make up an organization design? Using the definition of an organization given above, it appears that an organization is made of goals, tasks, people, an incentive system, a structure, and an information and decision system. To some extent, all of these are subject to strategic choice by the organization's decision makers. For example, a businessman starting a new enterprise has nearly unlimited choice concerning the goals and tasks of his new business. A government agency, however, generally has its missions and some of its tasks dictated to it. Its range of strategic choice is much more limited. (Galbraith, 1977)

This thesis will assume that for the most part, the goals, people, and incentive system of the Navy Finance

Center are not not subject to strategic choice. These things are dictated by law and regulation and require substantial long-term effort to change. Such change is not impossible, but it is outside the scope of this thesis. The tasks of the individuals within a data processing department are more variable but for the most part are dictated by the technology. Certain things must be done in order to meet the D.P. shop's goals. The structure and the information/decision system, however, are wholly internal to NFC and may be changed more readily. This thesis will therefore concentrate on the structure and the information/decision process within the data center as they relate to the tasks involved in a D.P. organization.

2. Organization Design Issues

The following section is a brief synopsis of those ideas and concepts presented in Organization Design (Galbraith, 1977) that will be used in this thesis. There are many more such ideas in that work that will not be addressed here.

Galbraith's central hypothesis is that as the uncertainty of the tasks in the organization increases, so does the amount of information that must be processed by decision makers during task execution in order to achieve a specified level of performance. That is, the coordination of activities becomes more difficult as the tasks become more uncertain because decision makers need to know more things

in order to make correct decisions. In this context, uncertainty means that the information possessed by the organization is less than the information required to perform the task. This shortfall of information is commonly caused by the diversity of goals in the organization and by the increasing division of labor. Both increase the number of variables about which the organization must collect information. Uncertainty is also the result of higher levels of performance. High performance requires that more variables be processed simultaneously. In order to deal with task uncertainty, organizations have developed certain mechanisms. Briefly, these mechanisms are the hierarchical structure, rules and procedures, and goal setting.

The organizational hierarchy is a natural outgrowth of the need to coordinate the specialized tasks performed when labor is divided among individuals and groups. The person performing the coordinating function assumes an authority role when required to resolve conflicts between the workers. Resource allocation is an example of possible conflict. The standard hierarchical organization structure implements this authority role while simplifying the coordinating function by reducing the number of links between units. These links will be called communications channels. By requiring that information only be passed vertically, the number of channels is far less than if direct communications channels were established between each

unit in the organization. The problem is that if all information and decisions must flow through these vertical communications channels, the channels will become overloaded. To avoid this, two other mechanisms are used.

Rules and procedures are pre-made decisions that are originally made by decision makers but are implemented by lower level personnel. The result is that many, if not most, decisions in an organization are made at lower levels and are decisions about which rule to apply to a specific situation. Therefore, the vertical communications channels in the hierarchy remain clear for other information.

A third mechanism for dealing with uncertainty is for decision makers to set goals for their workers. As long as each worker or work group is striving to achieve these pre-determined goals, the workers should act in a coordinated fashion. This reduces the number of decisions required of decision makers during task execution.

Despite these mechanisms, task uncertainty may increase to the point where such mechanisms become inadequate. Exceptions to the rules when there is too much ambiguity for workers to make correct decisions based on goals must be referred to upper level decision makers via vertical communications channels. Increasing numbers of exceptions place an increasing burden on these vertical communications channels. Once again, the channels become overloaded and the specified level of performance can no

longer be achieved. To alleviate this situation, new organization design strategies are required. These new strategies can be grouped into two types; strategies that reduce the need for information processing and those that increase the organization's capacity to process information.

There are two basic ways to reduce an organization's need to process information. The first is the creation of slack resources. A typical example of this is the creation of a large inventory of repair parts so that any demand by a customer for parts can be met quickly. The obvious disadvantage of this strategy is the cost to the organization of keeping such an inventory. An alternate version of the same strategy is to maintain a backlog of customer orders. This is also a slack resource. It may result in a loss of customers due to slow response to customer demands.

A second strategy for reducing information processing needs is the creation of self contained tasks. In this type of structure, the work group has within it all the resources that it needs to complete its task. The requirements to share information is contained within the group and is therefore less difficult. A computer program development project is an example of this. A program or project manager is in charge of a group of analysts, designers, and programmers who have dedicated computer and support resources. Such a group can produce the desired

output without the assistance of any other group. Both the reduced need for external coordination and reduced goal diversity of a self-contained task combine to reduce the need to process information. The costs of this are the possible under-utilization of scarce resources, such as software designers and computer time by dedicating that resource to a single task, and the organizational disruption caused by constantly forming and dissolving various projects. There are, however, other types of tasks that can be made into self-contained tasks where these objections do not exist. In these cases, the strategy of self-contained tasks may work very well.

The second type of strategy is to increase the capability of an organization to process information. The first of these strategies is the investment in vertical information systems. Vertical information systems may be an elaborate, computer based Management Information System. The same strategy may also be implemented by assigning an assistant to a decision maker. The assistant does the "legwork" of collecting information and thereby facilitates the flow of information to the decision maker. Both of these plans, however, require capital outlay by the organization.

The last strategy to be examined is the creation of selective lateral communications channels between working units. This brings decision making and coordination down to where the information exists rather than taking the

information to the decision maker. Decisions are decentralized without the creation of self-contained groups. Lateral communications channels can be as simple as informal meetings between two people from different groups that require communication and coordination in order to solve a common problem. A more formal lateral channel is the "chop chain" where managers of different work groups must approve a proposal or request before it is passed up the vertical channel to a decision maker. A third form of lateral channel is the creation of a designated linking or liason role. A "Production Coordinator" or a "Customer Service Department" are examples of formal lateral links in an organization. The disadvantage of this strategy is the possible loss of control by decision makers if lower level personnel do not keep their superiors informed of their activities.

Which of these strategies are most appropriate for a particular organization depends entirely on that organization itself. The uncertainty of its tasks and the desired level of performance are the key factors. There is no one "best way" to combine tasks, structure, and the information and decision process into an organization design.

This has been a brief discussion of the key ideas presented by Galbraith (Galbraith, 1977) that will be used in this thesis. These ideas will be used in a later chapter that will analyze tasks, structure, and the

information/decision process in the Navy Finance Center's Data Processing Department. The goal is to determine if the present design is a "good fit." These ideas will also be used to develop a design for the Consolidated Data Center.

The next step in this thesis is to determine what tasks (functions) are performed in any data processing organization in order to determine the information and decisions necessary to carry out and coordinate these functions. This description will be the basis for a subsequent analysis of N.F.C's D.P. Department.

III. DATA PROCESSING ORGANIZATION DESIGN

A. GENERAL

If an ADP operation were to be perceived as if it were a "black box," it would be apparent that its function was to provide computer and computer related services to users. More specifically, it could be seen that the ADP installation accepts users' requirements for program development, computer processing, and support services and returns computer products to the users. These products commonly include new or modified programs, reports, file updates, pay checks, key punch and telecommunications services, and so on. From a slightly broader perspective, there is an additional requirement on an ADP installation; to do its work in a manner that benefits the parent organization as a whole. This includes using its resources well and, assuming that resources are not unlimited, using its resources on those jobs that provide the greatest benefit for the whole organization. Stated briefly, the task of an automatic data processing installation is to produce computer products and services for the benefit of both the immediate users and the parent organization. (Frank)

Within the ADP installation there are divisions that perform specialized functions that contribute to the business of producing computer products for the users. These

functions can be grouped into any number of equally satisfactory ways for the purpose of description and analysis. In practice, these functions can be either centralized into one tight organization, dispersed throughout the whole organization, or arranged in some combination of centralization and decentralization. While there is some disagreement among various authors on the specific functional breakdown of an ADP organization, there is sufficient commonality to develop an acceptable list of functions and functional categories. The commonly agreed upon major functions of an ADP installation are: 1) program development, 2) computer processing, 3) technical support, and 4) management, including planning, administration, and control (Brandon, Norton Gaydasch, Frank).

The following list shows the four functional areas and the principle activities associated with each one. This list is not exhaustive and specific assignments are debatable. It is presented only as a list of common functions and not as a proposed structure. (Frank)

Functional areas	Activities
Program development	Feasibility studies
	Systems analysis
	Systems design
	Programming
	Testing
	Implementation
	Program maintenance

Computer processing	Receive input Keypunch Maintain data files Run scheduled jobs Dispatch output Maintain equipment
Technical support	Hardware analysis System software Data communications Data base development
Management	Planning Administration Standards and procedures Personnel Training Resource allocation Security Customer liason

In order to perform these activities, the ADP organization as a whole needs certain information. First, the ADP shop must know its users and their requirements. Users may be other divisions within the same organization or outside parties buying services. Requirements range from the running of an existing program at a specified time with data supplied by the user to requests for help in developing a new, vaguely defined application. Requirements can also include requests for data entry or telecommunications support. The exact requirements will depend on the specific organization in question. But the ADP installation must have this information on its users and their requirements. (Gaydasch)

The second type of information that the data processing shop needs is upper management's policies on just what

constitutes "benefiting the overall organization." Does this mean doing absolutely everything that the users want or being selective in providing services. On what basis shall this selection be made and who shall make it? This too will depend on the the organization in question. A commercial time sharing service or a shop that charges users for services may be in a position to accept a greater percentage of requests for service than an ADP department that has its own funding. Management policy on just what the ADP installation is expected to do is an information requirement that must be satisfied in order for the operation to function well. (Sinclair)

Having identified the tasks of the Data Processing organization and the information necessary for the operation to function, the next step is to examine the various structures that may be used as part of the overall organization design. Most authors agree that there is no one best way to structure the data processing functions. Different arrangements work well in different environments. The "bottom line" is to find a structure that "fits well" in a given situation. (Olson)

The key issues in data processing structures are departmentalization of functions and the degree of centralization. The size and complexity of the operation has the greatest effect on departmentalization. A small shop may not have the workload necessary to support a separate worker

or work group for each function. Therefore, a large number of functions will be grouped under one "box" in the organizational chart. In a larger organization, it is common to find people working on very specialized tasks and more divisions and branches in the organizational chart. Workload and complexity are the major determining factors. (Gaydasch)

The issue of centralization is more complicated and controversial. The workload and complexity of the operation are factors in determining the degree of centralization. However, a more dominant factor is the surrounding corporate environment. In this context, corporate environment includes the attitudes and beliefs of top management, the corporate organization structure and culture, the geographical spread of the parent organization, the quality and location of current D.P. resources, the perceived responsiveness of ADP to users' requests, and the role of D.P. in the organization's overall strategy. For example, a bank that is highly centralized, is very dependent on its computers, and demands the highest possible accuracy and reliability in its computer operations would not be comfortable with a decentralized D.P. structure. Top management would feel a lack of control over a vital corporate resource, even if all of the technical problems of decentralization were under control. (Gaydasch)

A data processing organization, however, is not monolithic. As pointed out earlier, there are commonly

recognized classes of activities. Each one of these can be structured with almost any degree of centralization or decentralization desired (Norton). In the remainder of this chapter, the advantages and disadvantages of each style of structure will be discussed along with a description of the tasks and information requirements of the four ADP functional areas.

B. PROGRAM DEVELOPMENT

The Program development Branch performs the function of developing and maintaining applications programs. (Systems software will be considered as part of technical support.) In terms of classic systems development or life cycle, this activity includes the preliminary and feasibility studies, design, coding, testing, and implementation (Biggs, Birks, & Atkins).

The information required from outside the Program development Branch are apparent. Who wants this program? Why? When? What is it supposed to do? This type of question is normally answered by the person or agency requesting the new or modified program. The other piece of information required is which of the proposed applications shall actually be developed. A related question asks how much effort (resources) shall be devoted to maintenance and how much to new development. A number of authors argue that this type of question should be answered outside the program

development shop (Sinclair, Nolan). They maintain that since ADP is a resource that affects the entire organization, the allocation of that resource in the form of what programs to develop and run should be determined at a level that can appreciate the costs and benefits of an application program to the whole organization. The level of effort to devote to maintenance is the same sort of decision since program maintenance uses the same resources as program development. Prioritizing and balancing user requests for maintaining and enhancing existing programs with requests for developing new programs requires the same, broad perspective. Assuming then, that users provide information on program requirements and that upper management provides information on which programs to develop and the level of effort to devote to maintenance and development, the next step in this analysis is to look inside a program development operation.

System development and maintenance generally requires five functions; analysis, design, coding, testing and implementation. Managing or coordinating all of these activities may be called a sixth function. How these functions are divided among development personnel depends on the size and complexity of the operation. A large shop may have dedicated software designers. A smaller one would probably share the design task between the analysts and programmers. (Fox)

The organizational structure that can support these functions can take many forms. The rational for choosing a structure is relatively independent of the technology. A decentralized structure disperses the the program development functions among the users. That is, each user or group of users has its own analysts, designers, and programmers. This allows development personnel to better understand their client's problems and requirements. Developers can therefore be more responsive to users' needs. In a centralized structure, the development personnel all work in one place. A centralized development branch is usually better able to attract and retain a staff of highly specialized professionals. Such a staff has more flexibility in scheduling. In addition, a centralized staff can avoid duplication of effort and proliferation of similar systems by developing company-wide applications. Another argument for centralization is the lack of qualified personnel to staff many small development branches. A larger, single group makes better use of the available talent. (Olson)

There are a range of combinations of centralized and decentralized systems. For example, the analysts may work with the users while the programmers are in one shop. Alternately, when a system is chosen for development, a separate project team made up of user and development personnel may be formed for that particular program. The choice depends on the needs of the organization. It must

balance the needs of the user for responsive service with the business requirement to make efficient use of personnel assets. (Frank)

C. COMPUTER OPERATIONS

The computer operations branch actually runs the computers. As seen from the outside, the computer operations branch's function is to produce output for use by customers. In some organizations, this includes a great deal of peripheral support operations such as data entry and distribution of output. In other places, these activities are the responsibility of the user.

Schedules are the primary information requirement for the entire computer operations branch; both short and long range schedules. A short range schedule normally covers one or two days. It has detailed information for operations personnel on what jobs to run and when to run them. It may also describe what to do with the output and when to make the system available for on-line users. Longer range schedules, weekly, monthly, and perhaps quarterly, provide the advance planning necessary to allocate computer resources and personnel. (Schaeffer)

The overall structure of the computer operations is highly variable. At one extreme is total centralization; one large computer center that serves the entire organization. At the other end of the scale is decentralization of

computer resources. Small and medium sized computers are located throughout the organization, normally with their prime user. The main argument for centralized computer operations are economies of scale. The four commonly identified economies of scale are: 1) computer equipment costs, 2) staff costs, 3) better financing, and 4) reduced software costs. Other benefits of centralization include: 1) increased flexibility due to reduced technical and economic constraints, 2) reduced number of computer conversions, and 3) easier data and physical security (Goulb). The chief advantage of decentralized computer operations is improved quality and responsiveness of service to the user. Other arguments include the decreasing cost of minicomputers, the reduced requirement for physical facilities such as power and air conditioning, and the improvements in data communications technology (Glasser).

An alternative is distributed processing. Distributed processing normally entails having computing resources located at the users' sites but with the computers linked by a network. There are system wide rules for standardization of data, programs, and system use. The idea is to build a network of smaller computers that acts like one big one. One advantage is an increased degree of system modularity to improve flexibility and fault tolerance. User involvement and responsibility for their own data and programs are also improved. The disadvantages of distribution are that such a

system is complex and difficult to manage (Canning). Continuing improvements in telecommunications and teleprocessing are making it more difficult to clearly distinguish between centralized, decentralized, and distributed systems.

Within the computer operations branch there are specialized functions. Commonly recognized tasks include data control, data conversion, job control, maintenance and operation of the data center library of storage volumes and documentation, computer processing, and output verification and distribution. The computer operations branch is also responsible for computer equipment maintenance and upkeep. (Schaeffer)

The information that the computer operations branch needs to know is what the day's work is and when and how to accomplish it. This information is usually provided by the daily schedule, program documentation, and the operators' equipment guides. The schedule describes when the system is to be available for on-line use and when it is to be used for batch jobs. It also describes the order in which to run scheduled jobs as well as each job's time frame; i.e., a job may not be run before some time or event and it must be completed before a specified time. Program documentation describes how to run a specific job, what to do and who to call in case of difficulty, and how to distribute the

output. Equipment guides describe the operation of specific computers and peripheral devices. (Schaeffer)

The specific structure of a computer processing operation is dependent on its size, technology, and on management's philosophy. A large, tape oriented, batch production shop requires a number of staff personnel performing the specialized functions listed above. A smaller shop or a shop that uses a higher percentage of direct access storage devices or mass storage and/or automated job scheduling and release can be operated by fewer personnel who often perform more functions. Such technology allows a more compact organizational structure. Management philosophy dictates how much pre- and post computer processing is done by the operations branch and also how much of the systems resources shall be dedicated to on-line applications. On-line work requires fewer personnel in the computer room. Off loading pre- and post-computer processing also eliminates personnel requirements in this branch and therefore changes its structure.

D. TECHNICAL SUPPORT BRANCH

The technical support branch is generally smaller than the other two branches already described. Its tasks are more technically difficult and often more uncertain. The tasks normally assigned to this branch are hardware analysis, systems software, data communications, and perhaps data base

development and maintenance. Each functional area is responsible for overseeing its speciality throughout the D.P. activity. This includes analysis of present and future capacity and capabilities, evaluation of new products, providing consultant services for operators and users, and making reports and recommendations to management. (Frank)

The information requirements for technical support are more difficult to define because the tasks are more uncertain. Technical support is often oriented towards solving problems as they occur. It is therefore difficult to predict what information will be needed. The most that can be said it that the technical support branch needs to work closely with the other branches, with management, and with vendors. This branch also needs access to detailed systems documentation. (Frank)

The structure of this group depends mostly on the size and technology of the D.P. activity. In a small organization, the technical support function may be performed by one systems programmer working within another branch. Even a moderate sized shop may include or distribute these functions in one or more branches. If there is a separate technical support branch, it will most likely be centralized as the technical skills and talents necessary for these jobs are still relatively scarce. (Gaydasch)

E. MANAGEMENT OF THE D.P. ORGANIZATION

The tasks that were listed earlier under the management functional area are really all of the other obvious activities that are necessary in any well run organization that are not already assigned to the other functional areas. In many ways, all of the activities already discussed can be readily grouped because the technology helps to catagorize them. Work on applications software goes to program development, hardware operation goes to computer processing, and the gray area in between goes to technical support along with any other activity that is heavily involved with technology and is not assigned elsewhere.

What is left are the more "non-technical" functions; at least on the surface. This includes all types of planning, administration, training, personnel, standards and procedures, and resource allocation. The last two activities are more technical than some of the others, but are included in management as they tend to cut across the boundaries of the other branches. The standards and procedures activity develops the rules that govern programs, systems operation, and data communication. The resources allocation activity implements management's policies on who gets how much of what resource. This includes deciding how much of the system's resources to devote to on-line applications and how much to batch jobs, how much to program development and how much to production work, and how much to each of the users.

The most common vehicle for promulgating resource allocation decisions is the schedule; that is, the resource allocation function actually writes the schedule for computer activities. To avoid lop-sided or unfair resource allocation, the scheduling writing is activity is often separated from the other functions. (Schaeffer)

The information needs of data processing management are basically a combination of all of the information requirements already listed. The major required pieces of information are : 1) who are the users and what are their requirements, 2) what are upper management's expectations, and 3) what are the D.P. operations present and projected capabilities resources, and constraints.

The structure of D.P. management can also be centralized or decentralized. For the management function, centralization and decentralization refers to the degree that the management activities are dispersed either to other functional areas or, in a large corporation, to divisional D.P. activities. For example in a very centralized system, all planning for systems and hardware development would be done at the management level, probably by a central planning staff. In a more decentralized organization, divisions or branches would develop their own plans that would be submitted to central management for review and approval. Obviously, there must be some degree of central control to

prevent total chaos. But the implementation and degree of central control can be widely varied. (Olson)

The degree of centralization and the structure of D.P. management is often influenced by the parent organization's management structure as well as by the complexity and size of the D.P. operation. If top management feels that divisional independence is a corporate strength, then the data processing management structure will likely be fairly decentralized. A very wide spread and complex organization is also likely to have some degree of decentralized management. A very tightly controlled activity, such as the bank described earlier, would be more comfortable with a highly centralized D.P. management (Goulb). The key question is, does he data processing organization design "fit" the overall organization in question.

This chapter has described the basic tasks, alternate structures, and information requirements for almost any D.P. activity. The next chapter will describe NCF's D.P. operation in more detail. The tasks and functions listed in this chapter will be identified in N.F.C.'s D.P. Department. How these functions are structured and how information flows within the department and between the department and the remainder of the Navy Finance Center will be examined. The final section the chapter will evaluate the appropriateness of N.F.C. Data Processing Department's organization design.

Is it a good fit? Can it be readily modified to become the Consolidated Data Center design?

IV. NFC DATA PROCESSING ORGANIZATION

A. NFC ORGANIZATION DESIGN

The following description of the Navy Finance Center and its Data Processing Department was developed from three major sources: 1) the NFC command briefing, 2) the NFC Organizational Manual (NAVFINCENINST 5400.2D), and 3) interviews conducted and observations made during a four day on-site research visit. To avoid duplication of these documents, a more narrative style will be used here. In addition, the organizational charts and lists of functions contained in organizational manuals do not readily identify the information requirements and flows that are essential to this type of analysis. This description will therefore focus on tasks, structures, and information requirements for both the Navy Finance Center as a whole and for its D.P. Department. The concluding section of this chapter relates these tasks, structures, and information requirements to the information processing and decision making mechanisms and strategies described in Chapter II.

1. Tasks

The Navy Finance Center has two primary functions. First, to ensure that Navy members are paid accurately and on time. This involves the computation of every member's paycheck twice a month and the actual production of checks.

In addition, NFC produces monthly Leave and Earning Statements and annual W-2 Forms for all Navy members. The Navy Finance Center's second major task is to produce a great deal of reporting data concerning pay and allowances. These reports are chiefly used by the Office of the Chief of Naval Operations for the purpose of planning, budgeting and managing the Navy's military pay appropriations. To accomplish this task, NFC has developed an organization and many systems to produce these products and to support and manage the production process.

2. Structure

The Navy Finance Center began the implementation of its present organization design in the late 1960's. The major purpose of that reorganization effort was to implement both the accrual and obligational accounting systems that would provide more timely and accurate data about obligations to the Navy's military pay managers. In this case, obligations are military pay that has been earned but not yet paid. In order to produce more accurate and timely financial reporting data while still providing responsive service to Navy members, NFC created a design consisting of three major sections; Operations, Systems, and Support. (See Figure 1)

The Operations side of the organization is actually five different sections that are collectively referred to as "Operations." There is no one "Operations Department" nor is

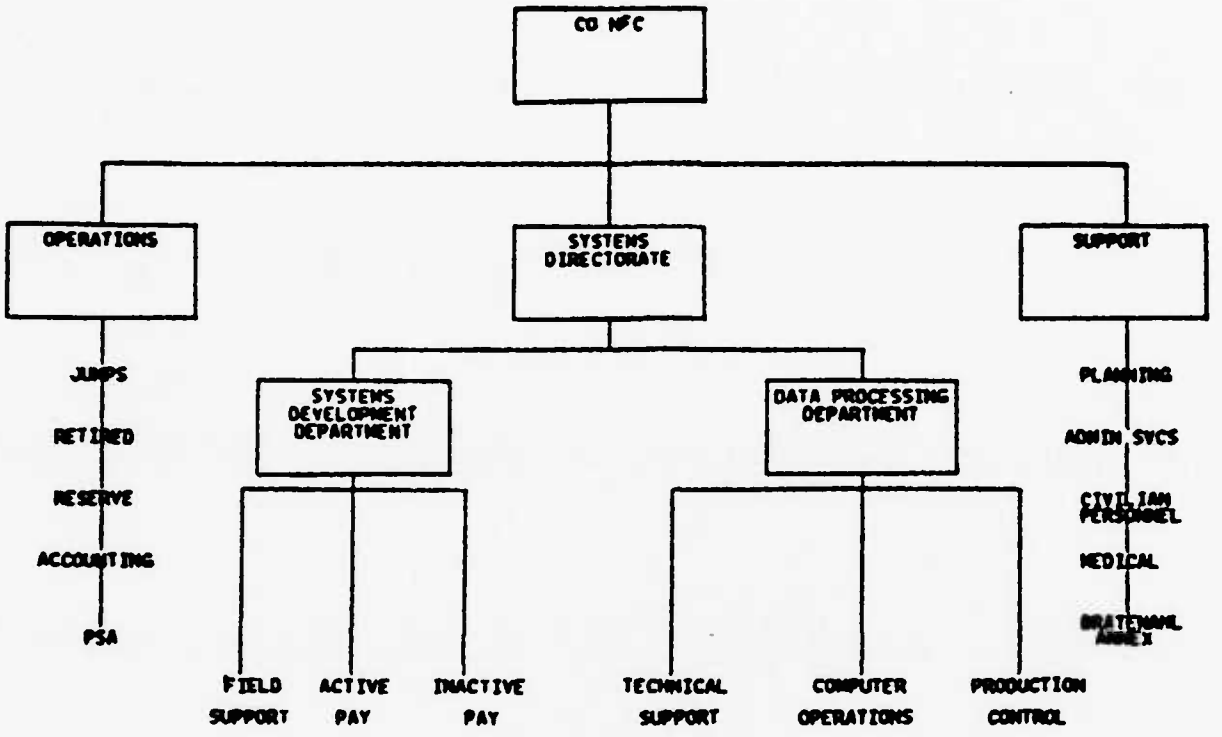

CO NFC
OPERATIONS
SYSTEMS DIRECTORATE
SUPPORT
JUMPS
RETIRED
RESERVE
ACCOUNTING
PSA
SYSTEMS DEVELOPMENT DEPARTMENT
DATA PROCESSING DEPARTMENT
PLANNING
ADMIN SVCS
CIVILIAN PERSONNEL
MEDICAL
FIELD SUPPORT
ACTIVE PAY
INACTIVE PAY
TECHNICAL SUPPORT
COMPUTER OPERATIONS
PRODUCTION CONTROL

Figure 1

there an "Operations Officer." The largest section is the JUMPS Directorate. It is made up of five departments that are each responsible for some aspect of active duty members' pay and allowances. The other sections within Operations are the Retired Pay Department, the Reserve Pay Department, the Accounting and Finance Department, and the Personnel Support Activity.

The Support section is also a collection of five departments. Each provides a specialized staff support function. The Planning Department includes the functions of the Comptroller along with Internal Review and Planning. The other departments are Administrative Services, Civilian Personnel, Medical, and the Bratenahl Annex Department. The Bratenahl Annex Department maintains the building and other physical facilities that house and support the computer center.

The third section in NFC's organization is the Information Systems Directorate. Unlike the other two sections, the Informations Systems Directorate is a separate entity and there is an officer, a Navy Commander, who is its director. There are two subsections; the Systems Department and the Data Processing Department. As this thesis is primarily concerned with the D.P. Department, the Systems Department will be discussed very briefly.

The Systems Department is a central systems development organization. The department is made up of

systems analysts, designers, and programmers. These personnel develop NFC's in-house applications and act as Central Design Authority (CDA) for systems that are distributed to field activities which support the Navy Finance Center's mission. The three main divisions in the Systems Department each work on different problems. The Field Support Division develops programs and systems that will be distributed to field activities. One example of such a project is a program to place a microcomputer and associated software aboard Navy ships and stations to convert disbursing data to machine code for transmission to Cleveland. The other two branches in the Systems Department are the Active Pay and the Inactive Pay Branches. An ADP Operations Branch has been approved but has not yet been staffed.

In addition to the personnel in the Systems Department, there is one programmer/analyst in each user department in Operations. This person becomes the expert on that department's operations and unique problems. The dedicated programmer/analyst does the initial work on determining user requirements and program design. He (she) then works with the Systems Department to complete the development effort. These personnel rotate periodically so that they spend time in both the user departments and in the Systems Department.

The Data Processing Department performs many of the functions that were described in Chapter III. Other functions that are necessary to a D.P. operation are either decentralized, normally by distributing the function among other departments, or are not formally addressed in the organization design. The Data Processing Department does perform most of the functions described as computer processing, technical support, and D.P. management. The program development function is assigned to the Systems Department and to the user departments in the Operations section.

3. Information Requirements

The information requirements among the three major sections of the Navy Finance Center are substantial. NFC is totally dependent on its computers to produce the bulk of its products; pay checks, LES's, W-2's, and reports. The workload is too complex and voluminous to accomplish any other way. The data processing system operates primarily in a batch production mode but with an increasing amount of on-line data entry and program development work. The on-line work takes place mostly during traditional business hours. The system is devoted to scheduled jobs at night.

The two most obvious information requirements among the departments concern computer processing (production) and program development. The operations personnel needs to know the status of production work. When are the various jobs

scheduled? Is a particular job going to be completed on time? If not, when? Conversely, the D.P. department needs explicit information on operation's requirements for doing production work in order to manage the system's capacity and to develop a detailed schedule for computer system operation. In the area of program development, the developers must know the capabilities and limitations of the D.P. systems. Developers need guidance on how a new or modified program will fit into and impact on the existing system. Is it feasible to develop and run a new application? Does it conform to the system's standards? Is there enough room in the schedule? The Data processing Department needs to know the specific programs that are being proposed and developed in order to produce this type of information. In addition, the D.P. Department needs to know the more strategic plans of the operations department and of NFC as a whole in order to make broad projections on workload and capacity. One of the goals of the PERSPAY Project is to ensure that NFC continues to have sufficient computer capacity before capacity becomes a real crisis.

This has been a brief examination of the tasks, basic structures, and information requirements for NFC as a whole. The next section is a more detailed look at the interior design and operation of the Data Processing Department.

B. D.P. DEPARTMENT ORGANIZATION DESIGN

The Data Processing Department has three major divisions and several staff support groups (see Figure 2). The D.P. Department is a multi-shift, multi-location operation. The Computer Operations Division works at the Issac Campbell Kidd Computer Center (ICKCC) located in the Bratenahl Annex. It works 24 hours a day every day of the year. The other divisions work in the Federal Office Building in downtown Cleveland. Within the Federal Office Building, there are offices and production operations on one upper floor and a print shop in the basement.

A Navy Commander is the Data Processing Department Head. He works directly for another Navy Commander who is in charge of the Systems Directorate. The Data Processing Department Head is responsible for the activities of his department and for being the interface for his department with the upper management of the Navy Finance Center. Working directly for the department head is a small administrative staff. This staff consists of two ADP security specialists, a five person planning staff that is currently devoted to the PERSPAY project, and a Training specialist. The Planning staff provides the nucleus members of planning activities with all other personnel being provided by other divisions in a matrix organization. All these personnel, other than the department head, are Civil Service employees.

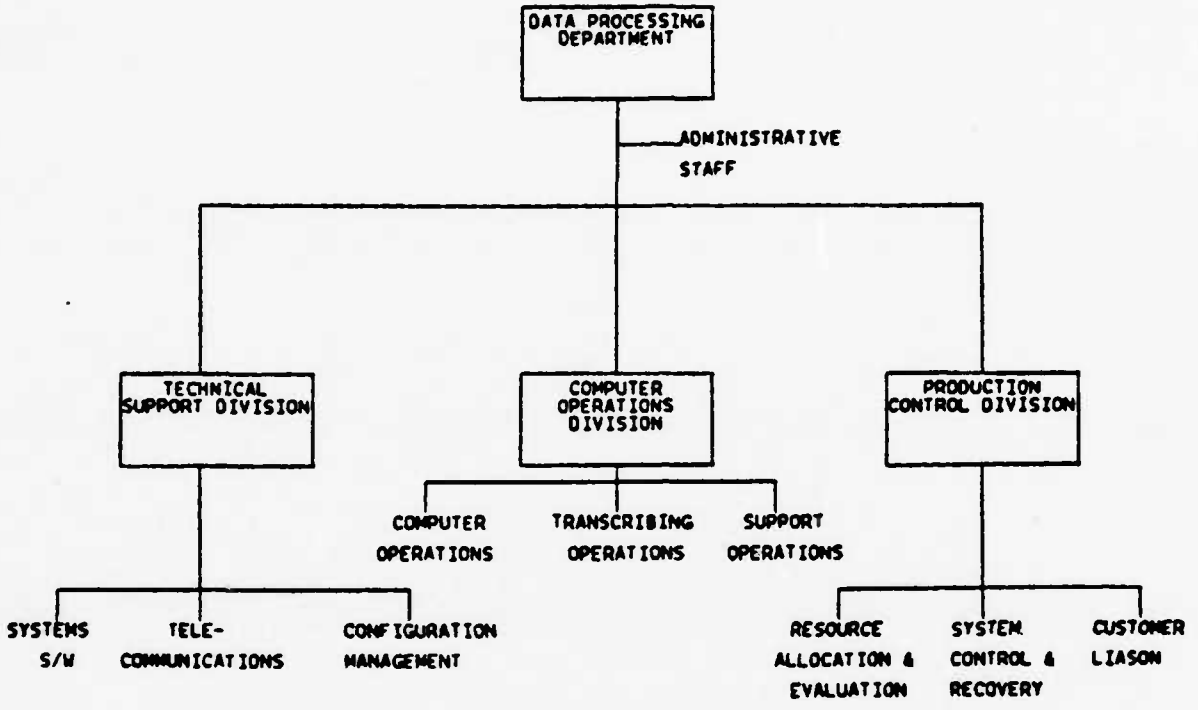

DATA PROCESSING DEPARTMENT
ADMINISTRATIVE STAFF
TECHNICAL SUPPORT DIVISION
COMPUTER OPERATIONS DIVISION
PRODUCTION CONTROL DIVISION
COMPUTER OPERATIONS
TRANSCRIBING OPERATIONS
SUPPORT OPERATIONS
SYSTEMS S/W
TELE-COMMUNICATIONS
CONFIGURATION MANAGEMENT
RESOURCE ALLOCATION & EVALUATION
SYSTEM CONTROL & RECOVERY
CUSTOMER LIASON

Figure 2

1. Technical Support

The Technical Support Division is composed of sixteen military and civilian technical specialists headed by a GS-15. The entire division is located in the Federal Office Building. The Technical Support Division is responsible for the functions traditionally associated with technical support; hardware, systems software, and telecommunications. The Systems Software Branch is charged with the oversight of the operating systems, compilers, programming aids, and utility programs such as report writers, sorts/merges, and data management programs. The current trend at NFC is towards the increasing use of unmodified commercial systems software. The Telecommunications Branch is primarily concerned with telecommunications software: control programs, message routing, and interfacing between units. This branch also works with software to support on-line program development and provides consultant services to the network operators. The Configuration Management Branch is tasked with the management of ADP hardware. Specifically, this branch studies the utilization of ADP hardware, determines the optimum configuration of the hardware, and implements changes when necessary. NFC does not currently use Data Base Management technology.

2. Computer Operations

The Computer Operations Division is normally run by a GS-13; a Navy Lieutenant Commander data processing specialist is the current division head. Working for the division head is a staff statistician who assists in various projects and with preparing reports. The other sections in the Computer Operations Division are the Computer Operations, Transcribing Operations, and Support Operations Branches. The Computer Operations Branch is located at the ICKCC in Bratenahl, the transcribing Branch is in the Federal Office Building, while Support Operations has facilities in both places.

The Computer Operations Branch actually operates the computer center; i.e., the computing equipment and the data center library. This branch is composed of approximately 30 Civil Service and enlisted Navy personnel divided into four shifts. A GS-12 is the computer center director. Each shift has a supervisor, master console operator(s), a job control language technician, and tape librarian(s) and handler(s). The exact number of personnel depends on the shift. Other personnel may work on some shifts. These include on-line console operators, an over-the-counter job control technician, and one or more peripheral equipment operators. The computer equipment consists of three IBM 370/158's. Two are coupled as a multiprocessing system. It is used for multi-programmed production work at night and for on-line

data entry and query during the day. Data entry transactions are stored for batch file updating at night. This operation is heavily tape oriented with over 20,000 reels of tape in the library and 26 tape drives in the computer room. The single IBM 370/158 is used for program development work.

The other two branches are involved with the support required for computer operations. The Transcribing Operations Branch consists of approximately sixteen civil service personnel headed by a GS-7. They perform data transcription and key punch services. The current trend is to reduce the size of this branch by decentralizing the function. Users and developers are being tasked with delivery of input in machine readable form.

The Support Operations Branch is tasked with traditional pre- and post-computer processing operations and with network operations. One or two network hardware operators are assigned to work at the ICKCC on each shift. They may be military or civilian personnel. At the Federal Office Building, the Support Operations Branch operates a telecommunications system between Cleveland and Washington, D.C., an OCR document processing system, a data relay between the FOB and Bratenahl, check printing, insertion, and distribution, several printers, and an output distribution system. Although some output is produced at Bratenahl, the current strategy is to reduce the amount of pre- and post computer processing done in the computer

center as much as possible. Therefore, the Support Operations Branch can be expected to grow.

3. Production Control

The third section of the Data Processing Department is called Production Control. This division performs some of the functions listed under management in Chapter III. Their overall task is to oversee the utilization of computer resources so that the resources are efficiently used and that user requirements are met. A GS-13 is in charge of approximately fifteen Navy and civilian personnel. All are located in the Federal Office Building.

The Resource Allocation and Evaluation Branch is run by a GS-12 and includes four other civilians. This branch is tasked with allocating computer resources to users for both production work and program development and to the computer operators for back-up, housekeeping, and training. In simpler terms, this branch writes the daily schedule. The schedule writers use a data base that provides information on how long each production job is expected to run and the resources that each job requires. Using this information, the Resource Allocation personnel build up a schedule to execute both continuing requirements, such as jobs that must be run daily or weekly, and on-demand jobs. A software scheduling package, the Data Center Management System by Value Computing, Inc., is used to produce the actual

schedule. This process will be discussed in more detail later in this chapter.

The Systems Control and Recovery Branch is headed by a GS-12. It has two major functions. First it provides quick solutions to problems with applications that do not execute to completion. If an applications program "abends," the computer operators call on Systems Control and Recovery personnel for assistance with putting the program back into the production stream. The branch's second major task is to ensure the compatibility and completeness of new and modified programs. This means that the code will execute properly on NFC's system and that the program's documentation, including the operator's and auditor's guides and the recovery and output distribution instructions, are complete, usable, and in conformance with NFC's standards.

The third branch in Production Control is the Customer Service Branch. A Navy Lieutenant is the branch head. The Customer Service Branch serves as a clearing house for communication between the Data Processing Department and the users. This communication commonly includes receiving requests for new services, answering questions on the status of programs on the daily schedule, and contacting users and programmers about programs on the schedule that fail to execute properly. This branch is the formal communications channel by which users normally interface with the D.P. Department.

4. Summary

All of the functions that are common to all data processing activities are found in the Navy Finance Center. Many are centralized in the Data Processing Department. Others are centralized elsewhere or are distributed. The list of functional areas and activities of a D.P. operation presented in Chapter III is repeated below with the addition of a third column that shows the department, division, or branch in NFC that performs that function. The purpose of this list is to summarize the organizational locations of D.P. functions and to relate the general description of a D.P. operation presented in Chapter III with this chapter's description of NFC's D.P. organization.

Functional areas	Activities	NFC location
Program development	Feasibility studies	User prog./analyst
	Systems analysis	Prog./analyst & Systems Dept.
	Systems design	Systems Dept.
	Programming	Systems Dept.
	Testing	Systems Dept. & Syst. Cont. Br.
	Implementation	User, Syst. Cont, & Resource Cont.
	Program Maintenance	Prog./analyst & Syst. Dept.
Computer Processing	Receive input	Transcribe. & Support Ops. Brs.
	Keypunch	User & Transcribe.
	Maintain data files	Comp. Ops. Br.
	Run scheduled jobs	Comp. Ops. Br.
	Dispatch output	Support Ops. Br.
	Maintain equipment	Comp. Ops. Br.

Technical support	Hardware analysis	Config, Mgt. Br.
	Systems software	Syst. S/W Br.
	Data Communications	Telecomm. Br. & Comp. Ops. Br.
	Data base development	Not in use
Management	Planning	Admin. staff
	Administration	Managers & staff
	Standards	Prod. Cont.
	Personnel	NFC Pers. Dept.
	Training	Train. Spec.
	Resource allocation	Resource All. Br.
	Security	Security staff
	Customer liason	Customer Svc. Br.

This description of the Navy Finance Center's Data Processing Department has covered its structure and tasks. To continue the analysis, it is necessary to examine how these branches operate together to achieve their common goal; to provide data processing services to NFC As described earlier, the key to coordination is an information based decision process. The following section will examine this organization's information processing mechanism's and strategies in the term's developed by Galbraith and presented in Chapter II of this thesis. How are these mechanisms and strategies used? Are they appropriate? Could they be improved?

C. ANALYSIS OF THIS ORGANIZATION DESIGN

The basic mechanisms described by Galbraith for processing information in an organization are the hierarchical structure, rules and procedures, and goal setting. The supplementary strategies are the creation of

slack resources, the creation of self-contained tasks, the investment in vertical information systems, and the creation of selective lateral communications channels. How are these mechanisms and strategies used in this case? To answer this question, the formal communications channels used at the Navy Finance Center will be described. Then these communications channels will be discussed in terms of mechanisms and strategies. Finally, an assessment will be made concerning how well these mechanisms and strategies are being used at NFC.

Note that the informal communications channels that are common to all organizations are not being addressed. While this type of communications exists at NFC, its scope and content are not identifiable and therefore cannot be analyzed.

1. Information Processing & Decision Making

The primary methods for routine, daily information processing and decision making at NFC regarding the Data Processing Department's activities all revolve the Production Control Division. The products and services produced by this division are all basically information. Each branch in the division deals with passing certain information both within the D.P. Department and to outside users.

There are two other types of information that do not stem from the Production Control Division. One is

information about the department that goes to and from higher levels; i.e., the Systems Director and the Commanding Officer. The Department Head is directly tasked with that responsibility. The second is requests for the Technical Support Division's services. All of these are passed through the Department Head. This system was implemented because of past problems with the uncontrolled use of that division's scarce resources. In order to control and equitably allocate the time and talent of the technical support personnel, the system of formal requests through the Department Head was developed. Note however, that these two types of information processing and decision making are the exceptions. The majority of the information processing and decision making in the Data Processing Department come from Production Control.

Each branch in Production Control produces one or more specific products or services. The Resource Allocation and Evaluation Branch produces the schedule and some management reports. The Systems Control and Recovery Branch produce standards for computer system usage and operations by developing programmer and operator bulletins and by certifying new programs. They also assist operators when necessary. The Customer Service Branch provides liason services between the D.P. Department and the users and developers. Each of these branches deal with the process of coordinating the efforts of the various departments that

produce and use ADP services. As an example of this process, the scheduling operation will be described in somewhat more detail.

The daily schedule is one of the basic information and decision tools used by NFC for coordinating ADP activities. The actual schedule is written by a software scheduling package that also produces management reports concerning computer operations. The primary workload on the Resource Allocation personnel is gathering and verifying the data needed by the scheduling program. This information is called the Job Data Base. When each application program is accepted for production, a Job Profile is created by the developers and schedulers. The data collected on each job includes: job identification, frequency of execution, predecessor and successor jobs, resources required, estimated run time, and pre- and post- computer processing requirements. As experience with the application grows, the run time estimate is refined and the schedule becomes more accurate.

The scheduling process is the method by which the D.P. Department determines user requirements and the resources required to meet them. The schedule also provides two other information requirements. First, the schedule provides operators in the Computer and Support Operations Branches with much of the information needed to accomplish the day's work. Second, the schedule informs users when

their jobs are being executed and when the system is available for on-line use.

One other function of the Resource Allocation and Evaluation Branch is the generation of reports concerning equipment utilization. This information is passed both upwards in the department and to the Configuration Management Branch in Technical Support. There it is analyzed and action recommended when necessary.

There is one other method of processing information and making decisions about data processing at NFC. Early in 1983, a Data Center Steering Committee was created. It consists of data processing and user managers who meet periodically to discuss issues of mutual concern. The committee makes recommendations for action as opposed to binding decisions.

2. Mechanisms & Strategies

The next question to answer in this analysis is how does NFC'c information and decision process relate to the concepts developed by Galbraith. To answer this, each of Galbraith's mechanisms and strategies will be listed followed by the methods by which they are implemented and used at NFC.

The organizational hierarchy is obvious both within the Data Processing Department and in the Navy Finance Center as a whole. Traditional vertical communications channels are in place. Operational and administrative

information is passed up and down these links. A prime example of the use of vertical communications is the system used to channel requests for Technical Support services through the Department Head. This method enforces decision making at higher levels at the cost of reducing the speed of communications and increasing the workload on the Department Head.

Rules and procedures are in use throughout NFC and its D.P Department. A few examples are the rules and procedures for obtaining help when a program "abends,", getting a new program certified and placed on the production schedule, and for requesting ADP services through the Customer Services Branch. All of these rules are the means by which operational level personnel can make routine decisions. The vertical communications channels remain clear for exceptional situations.

Goal setting is a mechanism that is not currently in widespread use. For example, there are currently no goals set by management for computer system performance; i.e., turnaround time, throughput, and response time. Such a goal would aid the schedule writing process and provide a clear measure of effectiveness for evaluating personnel, procedures and equipment.

The creation of slack resources is, for the most part, not a viable option. Being a public sector agency, NFC is mandated to use the taxpayer's dollars efficiently. The

creation of excess computer or personnel resources or the creation of a backlog of uncompleted jobs are clearly unacceptable options.

The creation of self-contained tasks is also a strategy with limited applicability. The present structure relies on each branch performing a relatively specialized task with a great deal of coordination required both within the D.P. department and with the users. It is difficult to imagine any extensive use of self-contained tasks in this situation without the creation of many small data processing operations in each user department. Such a design is not a viable option. Some limited projects, such as the PERSPAY planning effort, may be suitable for the use of a self-contained group. However, personnel constraints generally preclude this.

Vertical information systems are also not in any great use. NFC's overall structure and its D.P. Department structure are relatively "flat." There are few layers of intermediate level managers in the organization. This makes the investment in vertical information systems difficult to justify on the basis of costs and benefits.

The final strategy, selective lateral communications channels, is in extensive use at NFC. For example, users contact the D.P. Department for production services through the Customer Service Branch instead of through the Department Head. Similarly, System Control personnel

communicate directly with program developers. Resource Allocation personnel communicate with users and operators.

The overall methodology for processing information and making decisions in the D.P. Department can be stated very briefly. The organizational hierarchy is in place and is used to handle exceptional situations and where greater central control is desired. For the remaining activities, rules and procedures are used for both governing operational decision making and for implementing and controlling selective lateral communications channels. The other mechanisms and strategies are not in extensive use.

3. Assessment

The conclusion of this analysis must be an assessment. How well does this design fit? As yet, there is no objective, quantifiable way to measure organization design fit. Olson makes extensive use of statistics and other measurements in order to develop some standard for evaluating organization design fit for information services. However, her results were ambigious. However, Olson did develop a more subjective criteria for making this judgement. Instead of measuring fit, Olson recommends determining whether or not there is identifiable user and management dissatisfaction with information services. Such dissatisfaction is evidenced by a growing desire to change the way that computer services are organized. This is different from a desire to make a more technical change such

as installing a more powerful computer. Dissatisfaction is generally caused by a perceived lack of responsiveness by the D.P. activity to user requests and/or by inaccurate or untimely computer products and services. On the other hand, users and managers feel satisfied if their D.P. services are of high quality and if they have some control over both the level of services received and over new program development. (Olson)

Using these criteria, NFC's Data Processing Department appears to fit well. The system is especially responsive to user needs in that each department in operations has its own programmer/analyst to learn that department's problems and to help with program development. The computer system is available when needed for on-line work and the production system provides good service to users with certified programs. Output is as accurate as the input and is generally ready on time. There is no widespread or vociferous demand to modify the organization of D.P. services. By the best criteria available, the present design can be said to fit well.

The next chapter in this thesis will use this information to develop a similar organization design for the Consolidated Data Center.

V. CDC ORGANIZATION DESIGN

A. REQUIREMENTS

The tasks of the Consolidated Data Center have already been fairly well defined in the NMPC/NFC Support Agreement. In general, the CDC will operate and support the actual computer equipment for use by NFC and NMPC. The user commands will be responsible for transcribing and keypunch operations, the delivery of programs and data in computer readable form, and for the printing and distribution of output. The CDC will support scheduled production jobs, remote job entry, on-demand jobs, on-line data entry and querry, and on-line program development. These existing decisions constrain any organization design for the CDC.

The Support Agreement dictates centralized computer operations. The Brand X and PERSPAY studies indicated that there would be sufficient economies of scale to justify consolidation. Therefore, the CDC's organization design must be built around large scale computer technology.

The differences between NFC and NMPC also constrain design choices. The most obvious difference is that NMPC is in Washington while NFC is in Cleveland. This is not as big a difference as it first appears. The computer center in the Bratenahl Annex is already the remote processing activity for NFC; the user's offices are five miles away. The

addition of a second remote user is not a radical change for the computer center. It presents a greater problem for management.

The support agreement states that several aspects of the management of the CDC shall be shared between NFC and NMPC. These are planning, the development of standards, the setting of performance levels, and resource allocation. In terms of organization structure, these aspects of D.P. management are to be decentralized.

There are two more basic differences between NFC and NMPC. First, all of NFC's applications programs deal in some way with the Navy's payroll. NMPC's programs deal with a variety of personnel related subjects and do not neatly fit into any single category. The second difference is organizational. The Navy Finance Center works for the Comptroller of the Navy, who is the Deputy Under Secretary of the Navy for Financial Management; the Naval Military Personnel Command works for the Deputy Chief of Naval Operations (Manpower, Personnel, and Training). The lowest level superior that is common to both commands is the Secretary of the Navy.

The following list shows the functions that will either be centralized in the CDC or shared by NFC and NMPC.

Program development	Implementation & Testing
Computer operations	Receive input Maintain data files Run scheduled jobs Maintain equipment
Technical support	H/W analysis Systems S/W Data communications
Management	Planning (shared) Administration Standards (shared) Personnel Training Security Customer liason

All the other functions of data processing operations will distributed to the users at NFC and NMPC.

B. PROPOSED STRUCTURE

The proposed organization structure for NFC and the CDC are shown in Figures 3 and 4. The proposed Navy Finance Center Structure does away with the Systems Directorate and puts the Consolidated Data Center on the same level as Operations, Systems development, and Support.

There is the potential for conflict between the users at NFC and NMPC embedded in the PERSPAY concept. The CDC is supposed to impartially serve both users while remaining within NFC's organization. It is not difficult to imagine the CDC becoming biased towards NFC's users with regard to resource allocation or services offered. In an attempt to preclude this and to demonstrate the underlying good faith of NFC, the CDC should be made as independent as possible

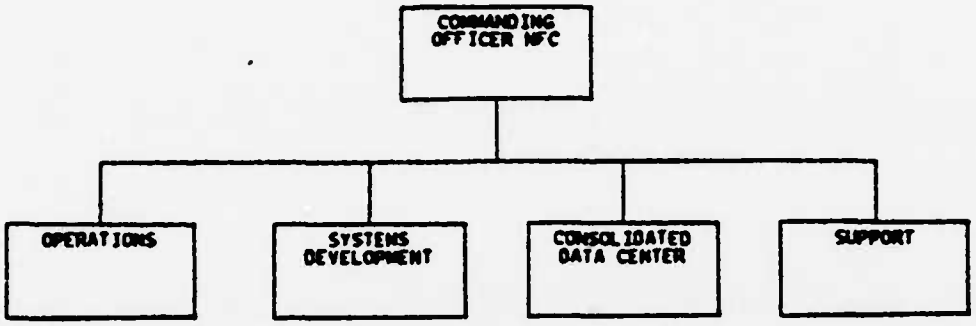

COMMANDING OFFICER NFC
OPERATIONS
SYSTEMS DEVELOPMENT
CONSOLIDATED DATA CENTER
SUPPORT

Figure 3

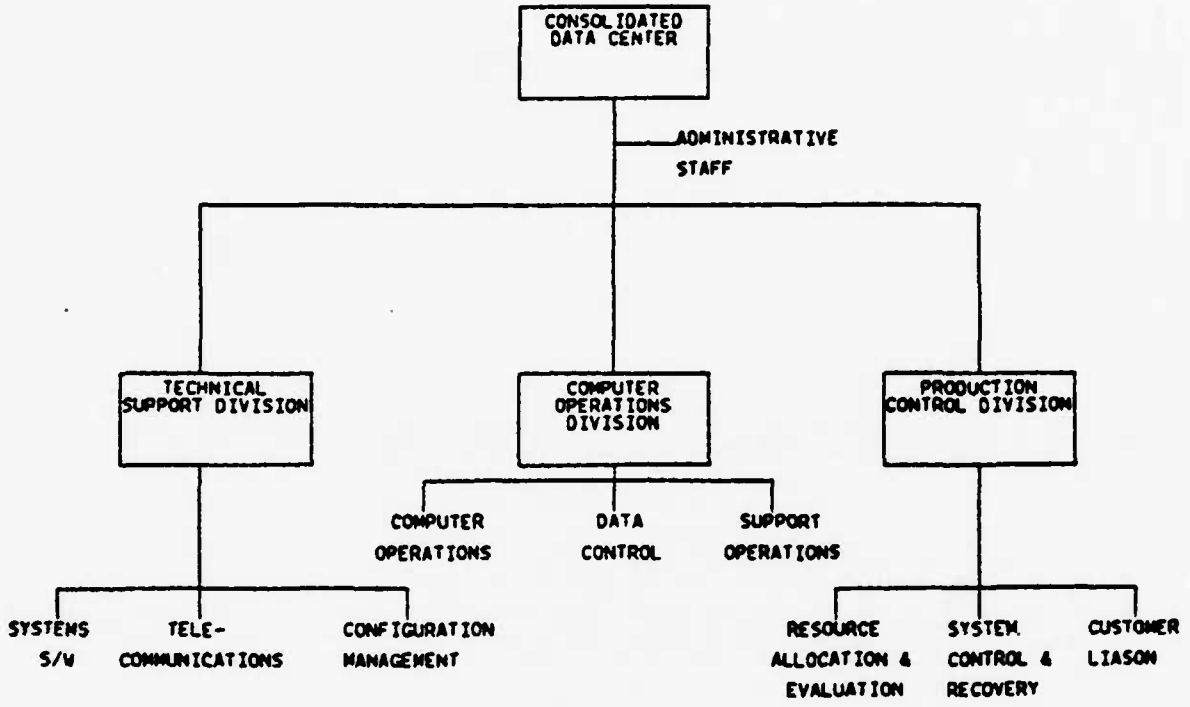

CONSOLIDATED DATA CENTER
ADMINISTRATIVE STAFF
TECHNICAL SUPPORT DIVISION
COMPUTER OPERATIONS DIVISION
PRODUCTION CONTROL DIVISION
COMPUTER OPERATIONS
DATA CONTROL
SUPPORT OPERATIONS
SYSTEMS S/W
TELE-COMMUNICATIONS
CONFIGURATION MANAGEMENT
RESOURCE ALLOCATION & EVALUATION
SYSTEM CONTROL & RECOVERY
CUSTOMER LIASON

Figure 4

while still remaining part of NFC. Therefore, the CDC Director should report only to the Commanding Officer of NFC and be on an equal basis with NFC's users and developers.

The organization structure of the CDC is the same as the present Data Processing Department except that the Transcribing Operations Branch is changed to a new Data Control Branch. The assumption here is that all transcribing and keypunch work will be distributed to the users and that all input to the CDC will be in machine readable form. The purpose of the Data Control Division is to manage the flow of data into and out of the CDC. This includes input and output between NFC and its field activities and between the CDC and NMPC. Strict control over this material will go a long way towards preventing conflicts and recriminations over a "lost" reel of magnetic tape.

There is a good argument for moving parts of the Support Operations Branch out of the CDC. The Support Operations Branch operates the networks between Bratenahl and the Federal Office Building and between Cleveland and Washington. This activity clearly belongs in the CDC. Support Operations also handles check and output printing and distribution. These activities are more closely aligned with the users at NFC than with the CDC. However, the current Support Operations activity works well. Also, there is no obvious place in NFC's organization to put the printing and distribution function. Therefore, it is

recommended that for the time being, the Support Operations be left intact and in the CDC in order to avoid any additional disruption over a fairly fine point in the PERSPAY concept. At a later time, this subject should be considered again.

In this proposed structure, every task listed in part A of this chapter is assigned to a specific section of the CDC. But this list of tasks and the organization's structure does not explain how the CDC will actually operate. The next section describes the proposed information processing and decision making process in terms of Galbraith's mechanisms and strategies. This will complete those aspects of the proposed organization design being addressed in this thesis. (The personnel and the incentive system aspects to organization design have not been considered.)

C. INFORMATION PROCESSING & DECISION MAKING

1. Mechanisms

The hierarchical structure of the Consolidated Data Center exists, but it presents one basic problem in its capacity as a tool for information processing and decision making. The lowest level common superior for both NFC and NMPC is the Under Secretary of the Navy. Routinely taking the problems and conflicts of the CDC to this level for resolution is clearly unacceptable. Therefore, some alternate vehicle for conflict resolution must be developed

for handling normal problems. This would leave the vertical channel for only the most difficult problems.

The use of rules and procedures should continue basically as they are used now. To avoid possible confusion by either users or operators, the development of a comprehensive User's Guide to the CDC is recommended. Such as guide would clearly define the rules for using the data center and the data center's responsibility's to the users. Schaeffer presents and excellent model for a User's Guide (Schaeffer).

The use of goal setting should be expanded. If upper management can set understandable and attainable goals for computer system performance, resource allocation, and the levels and types of services offered, operational and middle level managers can make fairly significant decisions and still be confident that their decisions are consistent with upper management policy.

2. Strategies

There is an anomaly in computer technology dealing with the creation of slack resources. When depicted on a graph, it becomes apparent that the demand for computer services generally increases over time in a fairly smooth, if sometimes steep, curve. Computer capacity, on the other hand, increases over time in a stairstep fashion. Computer capacity remains level until the system is upgraded or replaced. Then it jumps to a new capacity plateau. After

each jump, the system's capacity should exceed the demand for services, at least for a time. This is a slack resource. While it will not be permanent, the CDC should have considerable excess capacity until all of NMPC's workload migrates to Bratenahl. This slack resource should be used carefully as a tool that will help the CDC attain high levels of performance while also reducing both the amount of information that must be processed and the decisions that must be made during task execution. For example, there should be more computer time available for program testing and for program re-runs. The need to use this excess capacity to work out the new system's and program's "bugs" should diminish as the CDC and the users become more efficient and as the slack resource is utilized by normal workload growth.

No expanded use of self-contained tasks or for vertical information systems is recommended. The proposed organization design relys heavily on careful and through coordination among the various user and CDC divisions. Self-contained tasks and vertical information systems do not lend themselves to this approach.

Lateral communication channels will continue to be the key to this operation. The three basic linkage systems, the Production Control Branches, should be expanded to include the users in Washington. Requests for services should continue to be managed by Customer Service while

System Control certifies new programs and Resource Allocation works out the production schedule. These linkage activities, given clear rules, procedures, and goals can perform most of the coordination between both the users and the CDC and within the CDC itself. It is recommended, however, that a CDC Customer Service Activity be set up within NMPC as a local linkage activity for the Washington users.

Two new lateral communications channels are recommended to enhance this process. The current Data Center Steering Committee is a useful device for identifying issues and alternatives. However, it has neither the global viewpoint nor the intrinsic authority to make binding decisions that affect all the players. It is recommended that a CDC Control Board be instituted. The board would consist of the Commanding or Executive officers of both NFC and NMPC, the Director of the CDC, and a top management representatives from a few key users. The Control Board serves two functions. One is to provide a lateral communication channel for the upper management of both the users and the CDC. The second is to serve as a reasonably available substitute for a superior authority common to both commands. The Control Board would deal with issues such as policies on resource allocation and priority for new applications development. The Control Board should reach decisions by consensus and such decisions would be binding.

When there is no consensus, the normal chain of command would be used. Articles by Sinclair (Sinclair) and Nolan (Nolan) describe the structure and tasks of a Control Board in more detail.

The second recommendation deals with new program development. The current certification and scheduling procedures take place near the end of the program development cycle. A vehicle for earlier communications is recommended. A fairly simple report called the Data Center Impact Statement would serve this need. The Impact Statement should be prepared jointly by the developers and the CDC during the preliminary and feasibility studies and updated as the development effort continues. The Impact Statement would describe the impact of the new program on the Data Center; ie., will the new program fit into the schedule without being overly disruptive of existing applications. The Control Board should review these Impact Statements and decide if the proposed development should be continued. (Murry)

3. Summary

This chapter has described the preassigned tasks and the proposed structure and information processing/decision making mechanisms and strategies for the Consolidated Data Center. There are only two structural changes; moving the CDC "up" in NFC's organizational hierarchy and changing the Transcribing Branch to a Data Control Branch. The

information/decision process is changed by incorporating the new users into the existing systems. It is augmented by the increased use of goal setting, the creation of a Control Board to substitute for a common superior, the creation of a Customer Service activity in Washington, and the use of the Data Center Impact Statement to manage the inclusion of new applications into the CDC's production process.

Implementing these changes in an orderly fashion requires a well considered transition plan. Actually developing the final, detailed transition plan is outside the scope of this thesis. However, the next chapter describes how this planning process can be done and proposes a first broad overview of a transition plan.

VI. TRANSITION PLANNING

A. ISSUES

The basic goals of this thesis are to first describe how the new Consolidated Data Center can operate and second, how NFC can plan the transition of its present Data Processing Department into the CDC. The two assumptions that underlie the methodology used in this thesis are that transition planning requires a clear understanding of both the present and the future operations and that this understanding can be acquired through the concept of organization design. The differences between the designs of the present and future organizations are the issues that must be addressed in the transition plan. These differences were summarized at the end of the previous chapter. Implementing these changes will give the CDC the the organization design that it needs to effectively and efficiently operate as a joint use computer center.

Within the Consolidated Data Center project, however, there are other issues besides organization design that involve NFC and its D.P. Department. The total CDC project can be thought of as being three different projects that have been combined into one large effort.

The first of these sub-projects is developing and implementing the connections that will allow NMPC to use the

ICKCC in Bratenahl. This sub-project has two parts. The first is the organization design problem that has been addressed in this thesis. The proposed design will give the CDC the organizational tools that it needs to link the CDC with NMPC. The second problem is the development of the teleprocessing links between the CDC and the users in Washington. This includes both the hardware and software needed to communicate between the computer center and the users and the systems software that gives the remote users access to the system.

The second sub-project is the increase in the size of the data processing facility. This sub-project can also be broken down into parts. The present computers and peripheral devices will be replaced by more powerful equipment. NFC's ADP workload will be transferred to this new system. The Bratenahl Annex, that is the building itself, will be enlarged to provide sufficient floor space for the new equipment. New personnel will be added to the organization. Additional shift workers will be needed at the ICKCC as well as personnel in Production Control and Technical Support. When completed, the additional computer capacity, floor space, and personnel will give the CDC the resources it needs to absorb its new user.

The third sub-project that makes up the total CDC effort is the actual migration of NMPC's ADP work to the CDC. The steps in this project include the modification of NMPC's

programs so that they will correctly operate with the MVS operating system and conform to the CDC's standards. The second part of this process is the integration of NMPC's programs into the CDC's production process. The proposed integration procedure has been described in Chapters IV and V of this thesis.

B. CONSTRAINTS, RESOURCES, AND GOALS

The primary constraint on this particular planning problem is that the CDC project has already been started and has been in progress for several years. Many different individuals and groups are currently working on various aspects of the project. The NFC D.P. Department Planning Staff is working on the technical and managerial issues that concern NFC. The six joint working groups listed in Chapter II are solving problems that involve both users. NFC's transition must therefore utilize both the existing working groups and the work that has already been accomplished. Further, the transition plan must ensure that the future efforts of the working groups are coordinated and all proceed towards the desired outcome.

The second constraint on the transition plan is that regardless of anything else, NFC must produce its paychecks, LES's, and reports on time. Missing any payday or report deadline would have unacceptable consequences. This means that the installation of the new computers and the migration

of NFC's ADP work to the new machines must be as fail-safe as possible.

The resources available to NFC are basically the same as the constraints. The joint working groups are already formed and are operating. They provide a work force with the necessary technical expertise and knowledge of the problems and objectives of the program. Also, the work that has already been accomplished provides a solid basis on which to build. The new computers have been selected and a solicitation document has been released. The overall PERSPAY Project has been defined and the Support Agreement has been approved. Many basic decisions have already been made.

Another resource that will greatly aid the transition is the availability of dedicated computer resources for NMPC's program conversion effort. An IBM 4341 in Cleveland and an IBM 3033 in Washington will be used by NMPC for conversion, testing, and parallel processing.

Since all of this work is already done or is in progress, what is the goal of this transition plan? This plan deals only with NFC's D.P. Department and its conversion into the CDC. It is not concerned with NMPC's program modification problem. It is only interested in when the programs will be ready for migration. This plan will be concerned with implementing the work that is being accomplished by the joint working groups; for example, implementing the new telecommunications system. The plan

must also deal with equipment procurement and installation, NFC's workload transfer, the CDC organization, and the buildup of personnel. According to the Support Agreement, these issues are all NFC's responsibilities.

C. PLANNING

Planning has two purposes. The first is to identify all the tasks necessary to the project, their interrelationships, and the resources necessary to complete them. The second purpose is to provide a tool that middle and upper level management can use to monitor the progress of the project. These purposes lead to the structure that is common to many types of plans: 1) a chronological list of tasks with the name of the person responsible for each task along with the resources required and the time allowed, and 2) the milestones that will be used by management to monitor progress (Cross). This information should be presented on a Gantt Chart; a PERT Chart can also be used if there is someone with the time and knowledge to maintain it.

This constitutes the basic planning process. However, the CDC transition is too large and complex a project for any one person or group of people to be able to identify and put in sequence all of the tasks and resources that are necessary. Instead, the initial planning effort should produce one list of manageable size that broadly defines overall tasks, resources, and timing. Successive iterations

of this process using each step of the overall plan will ultimately produce a sufficiently detailed plan that can be executed.

The following is a brief example of the initial stages of this process. Only tasks are identified in this early phase; timing, interdependencies, and resources required are identified after development of a sufficiently detailed list of tasks.

INITIAL TASK LIST

I. Develop links between CDC and NMPC.

- A. Organization design.
- B. Telecommunication system.

II. Increase size of ICKCC.

- A. New computers & peripherals.
- B. Enlarge Bratenahl Annex.
- C. Enlarge staff.

III. NMPC work migration.

- A. Modify NMPC's programs.
- B. Integrate into production process.

FIRST ITERATION

I. Develop links between CDC and NMPC.

- A. Organization design.
  1. Move CDC "up" in NFC.
  2. Change Transcribing to Data Control.
- B. Telecommunication system.
  1. Determine system requirements.
  2. Determine constraints and resources.
  3. Develop alternative approaches.
  4. Select one system for development.

II. Increase size of ICKCC.

A. New computers & peripherals.

1. Procure.
2. Install.
3. Transfer in-house workload.

B. Enlarge Bratenahl Annex.

1. Determine requirements.
2. Develop building plans.
3. Obtain funding.

C. Enlarge staff.

1. Determine ultimate staff requirements.
2. Determine when staff will be required.
3. Explore alternatives--promote from within & hire entry level personnel; hire new personnel in all levels; transfer personnel from Washington.

III. NMPC work migration.

A. Modify NMPC's programs.

1. Provide guidance on CDC standards.

B. Integrate into production process.

1. Identify programs for migration.
2. Prepare Data Center Impact Statements.
3. Determine timing for migration.
4. Build Job Data Base.
5. Certify programs.
6. Schedule programs.
7. Parallel processing.

SECOND ITERATION (ORGANIZATION DESIGN ONLY)

A. Organization design.

1. Move CDC "up" in NFC.

a) Determine time for change.
b) Determine exact organizational duties.
c) Identify personnel to head CDC and Systems Development.
d) Draft changes to Organization Manual

2. Change Transcribing to Data Control.

   a) Determine workload requirements.
   b) Determine personnel requirements--skills and numbers.
   c) Analyze current transcribing work--what can be transferred to users? What must be kept in the CDC?
   d) Study staffing--should current staff be transferred to users or trained in Data Control?

D. SUMMARY

This has been a very brief look at the planning process. More detailed descriptions of ADP planning are available in Cross (Cross) and Cortada (Cortada). Manufactures of computer hardware such as IBM can also provide guidance in planning a conversion project.

VII. CONCLUSION

A. SUMMARY

One of the objectives of this thesis was to present a useable synopsis of some of Galbraith's concepts of organization design and has demonstrated that these concepts can be useful in the creation of the Consolidated Data Center. By identifying and differentiating between the organization's tasks, its structure, and its information processing and decision making system, the CDC's designers can more clearly understand how the new organization will actually operate. One recommendation is that the designers will consider the concept of vertical communications channels within the organization's hierarchical structure. These channels are routinely used for coping with exceptions to pre-made rules and procedures. However, without some other methods for information processing and decision making in the form of goal setting and the use of selective lateral communications channels, the vertical channels in the CDC will quickly become overloaded.

The actual proposed changes to the present organization design that have been developed here can be summarized very briefly:

1) Structure.

   a) Move the CDC "up" in NFC's hierarchy.

   b) Change Transcribing Operations to Data Control.

2) Information processing & Decision making.

   a) Create an upper management Data Center Control Board.

   b) Establish clear goals to aid middle managers in decision making.

   c) Develop and use a Data Center Impact Statement for early communication in the system development cycle.

   d) Integrate NMPC into the existing Production Control procedures.

   e) Create a Customer Liason activity in Washington.

The proposed planning process for developing the transition plan can also be briefly summarized:

1) Identify the issues to be addressed in the transition plan by comparing the present D.P. Department to the CDC.

2) Identify the constraints, resources, and goals the will affect the transition plan.

3) Use the iterative process to develop increasingly more detailed lists of tasks, interdependencies, and resources.

4) Use a formal planning chart and establish pre-defined milestones for management review.

Individually, these proposals are fairly simple changes to the D.P. Department. They are all based on widely accepted principles of data processing management. However, taken as a whole, the recommended changes would create an integrated and workable design that should help solve many

of the problems that are inherent in an organization as complex as the Consolidated Data Center.

B. SUGGESTIONS FOR FURTHER RESEARCH

There are two other aspects to Galbraith's theory of organization design that have not been addressed in this thesis. One deals with personnel. How should personnel be selected, trained, and promoted? The system used for dealing with such issues will greatly affect the organization's performance. The other issue is the organization's incentive system. What incentives are available to help motivate personnel to behave in a fashion that benefits the organization? How are these incentives used?

An investigation of the aspects of the CDC's organization design could yield several important benefits. It is recognized that changes to the personnel and incentive systems in a government agency are limited by law and regulation. But a thorough analysis would determine how the systems now in use actually affect the CDC's performance. There may be some beneficial changes that can be implemented by the CDC. Other recommended changes, backed up by good research, can be forwarded up the chain of command for action.

The proposed study, when combined with this thesis, should provide the CDC's management with a clear picture of

their organization's design and the possibilities for improvement.

LIST OF REFERENCES

1. Biggs, Charles, L., Birks, Evan, G., & Atkins, William, Managing the Systems Development Process, Prentice-Hall, 1980.

2. Brandon, Dick, Data Processing Organization and Manpower Planning, Petrocelli, 1974.

3. Brand X, DCNO(MP&T)/NAVCOMPT Brand X Site Study, Naval Data Automation Command; Conversion and Project Management Directorate, 15 February, 1979.

4. Cortada, James W., Managing DP Hardware, Prentice-Hall, 1983.

5. Cross, Phillip C., "Consolidating Remote Sites, Part IV: The Conversion Process," in Auerbach Data Center Operations Management, Auerbach, 1981.

6. Canning, Richard G., "In Your Future: Distributed Systems?" EDP Analyzer, Vol 11, No 8, August, 1973.

7. Fox, Joseph M., Software and its Development, Prentice-Hall, 1982.

8. Frank, Michael R., The Effective EDP Manager, Amacom, 1980.

9. Galbraith, Jay R., "Designing the Innovating Organization," Organizational Dynamics, Winter, 1982.

10. Galbraith, Jay R., Organization Design, Addison-Wesley, 1977.

11. Gaydasch, Alexander, Jr., Principles of EDP Management, Reston, 1982.

12. Glasser, George, "The Centralization Versus Decentralization Issues: Arguments, Alternatives, and Guidelines," Data Base, Vol 2, No 3, Fall/Winter, 1970.

13. Goulb, Harvey, "Organizing Information Systems Resources: Centralization Versus Decentralization," in F. Warren McFarlan & Richard Nolan, editors, Information Systems Handbook, Dow Jones-Irwin, 1975.

14. Murry, John, "The Data Center Impact Statement," in Auerbach Data Center Operations Management, Auerbach, 1981.

15. NMPC/NFC ADP Support Agreement, October, 1980.

16. NMPC PERSPAY Project Management Plan, 22 April, 1982.

17. Nolan, Richard L., "Managing By Committee," Harvard Business Review, July-August, 1982.

18. Norton, David P., "Information System Centralization: The Issues," in F.W. McFarlan Jr., R. Nolan, & D. Norton, editors, Information Systems Administration, Holt, Reinhart, & Wilson, 1973.

19. Olson, Margrethe H., Organization of Information Systems, Alternative Approaches, UMI Research, 1980, 1979.

20. PERSPAY Economic Analysis, Naval Data Automation Command; Conversion and Project Management Directorate, December, 1979.

21. Schaeffer, Howard, Data Center Management, Prentice-Hall, 1981.

22. Sinclair, Jack E., "Planning & Controlling the Data Processing Environment," Managerial Planning, Sep/Oct, 1979.

INITIAL DISTRIBUTION LIST

		No. Copies
1.	Defense Technical Information Center Cameron Station Alexandria, Virginia 22314	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, Ca. 93940	2
3.	Richard S. Elster, Code 54 EA Department of Administrative Sciences Naval Postgraduate School Monterey, Ca. 93940	1
4.	Assoc. Prof. R. Weissinger-Baylon Code 54 WR Department of Administrative Sciences Naval Postgraduate School Monterey, Ca. 93940	5
5.	LCDR Norman H. Crane 3768 Corral Canyon Rd. Bonita, Ca. 92002	1
6.	Commanding Officer Navy Finance Center Attn: Code 52 Anthony J. Celebrezze Federal Building Cleveland, Ohio 44199	3
7.	Commander Naval Military Personnel Command Attn: Code 16B3 Washington, D.C. 20370	2
8.	Computer Technology Curricular Office Code 37 Naval Postgraduate School Monterey, Ca. 93940	1
9.	CDR J.M. Richards 4132 Minton Drive Fairfax, Va. 22032	1

END

FILMED

9-83

DTIC